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**EP-A- 0 102 923**  
**DE-A- 2 814 329**  
**FR-A- 2 144 721**

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## Description

## TECHNICAL FIELD OF INVENTION

5 This invention relates to a detergent composition; particularly it relates to a fabric-washing detergent composition having improved colour-care properties.

When washing coloured fabrics, various factors can contribute to a loss of colour brightness. Thus, the redeposition of soil from the wash liquor may result in colour dulling.

Also, when washing mixed coloured fabrics and mixed loads of coloured and white fabrics, there is the  
 10 risk of dye-transfer through the wash liquor from one fabric to another, which will result in bleeding of colours, discolouration and/or staining of the fabrics. With the fashion of moving towards more coloured clothing and textile materials, especially multi-coloureds, the problem of dye-transfer in the wash has become more acute.

## 15 BACKGROUND AND PRIOR ART

Various proposals have been made in the art to resolve this problem, but so far without much success.

For example, in GB-A- 1 368 400 (Procter & Gamble), dye-transfer-inhibiting compositions were proposed which comprise a peroxygen bleach compound, e.g. an organic peroxyacid, combined with rather  
 20 complex aldehyde or ketone compounds as bleach activators. These compositions have several drawbacks in that not only do they use rather expensive and complex chemical compounds, but also in that they are not very effective.

Other compositions having dye-transfer-inhibiting action are also disclosed in EP-A- 0024367 (Unilever) and EP-A-0024368 (Unilever) based on the activation of organic peracids or organic peracid precursors with  
 25 bromide ions. Still, the main drawback of these compositions is that they too exert a rather strong direct fabric dye bleaching, tending to cause fading of the coloured fabrics.

EP-A- 0058444 (Unilever) describes washing compositions comprising a bleach system consisting essentially of an organic peracid or an organic peracid precursor in conjunction with a water-soluble iodide salt. There are some snags in the use of iodide catalyst, namely 1) the risk of staining due to iodine  
 30 formation and 2) the effect of direct fabric dye bleaching.

EP-A- 0143491 (Unilever) proposes the use of a copper catalyst together with a peracid compound as the bleach system for reducing dye-transfer, and in GB Patent 1 450 234 (Kao Soap) there is disclosed a bleaching detergent composition comprising sodium percarbonate together with polyethyleneglycol or polyvinylpyrrolidone.

35 Apart from the above-mentioned drawbacks, the proposed compositions of the art are deficient in one way or another and are thus far from ideal for being satisfactory as having real colour-care properties.

Efficient washing of coloured and mixed coloured/white fabrics requires more than cleaning alone; it should also take good care of the colours in a way that colour-bleeding due to dye-transfer, greying, dulling and/or fading, as well as changes in hue, are minimised such that the original colours and brightness of the  
 40 fabrics are preserved as much as possible.

Polymers have been used within compositions designed to inhibit dye transfer from textiles during washing. For example, EP-A-0 102 923 (Ciba Geigy AG) discloses the use of 2-30% of carboxyl group containing polymers within an aqueous composition, DE-A-2 814 329 (Henkel) discloses the use of 0.5-4% N-vinyl-oxazolidone polymers and FR-A-2 144 721 (Procter & Gamble) discloses the use of 15-35% of a  
 45 copolymer of polyvinylpyrrolidone and acrylic acid nitrile or maleic acid anhydride within a washing powder.

It is an object of the present invention to provide an efficient detergent composition which can be used for washing of mixed coloured and mixed loads of coloured and white fabrics, having improved colour-care properties with only minimal to substantially nil dye-transfer, wherein the drawbacks of the art are mitigated to a substantial degree.

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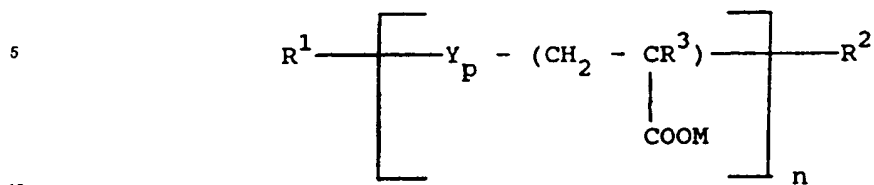
## DEFINITION OF THE INVENTION

According to this invention, a detergent composition adapted for washing fabrics and having improved colour-care properties is provided, comprising a detergent-active material and a detergency builder  
 55 characterised in that it further includes from 0.3% to 15% by weight of a polymer mixture comprising the following polymeric materials (a), (b) and (c):

(a) an alkali-metal carboxymethylcellulose;

(b) a vinylpyrrolidone polymer having an average molecular weight within the range of 5,000 to 350,000;

(c) a polycarboxylate polymer selected from compounds having the empirical formula:



wherein Y is a maleic acid (anhydride) unit; R<sup>1</sup> and R<sup>2</sup> are bleach- and alkali-stable polymer-end groups; R<sup>3</sup> is H, OH or C<sub>1</sub>-C<sub>4</sub> alkyl; M is H, alkali metal, alkaline earth metal, ammonium or other water-soluble cation; p is from 0 to 2; and n is at least 10; and mixtures therefore; at a mixing ratio of (a) to (b) within the range 1:2 to 2:1 and of (b) to (c) within the range 1:1 to 1:4.

#### DESCRIPTION OF THE INVENTION

The individual components of the polymer additive system are well known in detergent technology and may have found commercial exploitation. However, the specific combination is especially beneficial in fabric-washing detergent compositions having improved colour-care properties.

#### THE DETERGENT ACTIVE MATERIAL

The detergent composition of the invention contains at least one detergent-active material which may be anionic, nonionic or cationic in nature, but mixtures of anionic and nonionic materials are preferred.

The anionic detergent-active material can be a soap or a non-soap (synthetic) anionic material. Anionic detergent-active materials are commercially available and are fully described in the literature, for example in "Surface Active Agents and Detergents", Volumes I and II, by Schwartz, Perry and Berch.

Synthetic anionic detergent-active materials useful in the present invention are water-soluble alkali metal salts of organic sulphates and sulphonates having alkyl radicals containing from 8 to 22 carbon atoms, the term alkyl being used to include the alkyl portion of higher acyl radicals. Examples of suitable synthetic anionic detergent compounds are sodium and potassium alkyl sulphates, especially those obtained by sulphating higher (C<sub>8</sub>-C<sub>18</sub>) alcohols produced for example from tallow or coconut oil, sodium and potassium alkyl (C<sub>9</sub>-C<sub>20</sub>) benzene sulphonates, particularly sodium linear secondary alkyl (C<sub>10</sub>-C<sub>15</sub>) benzene sulphonates; especially those ethers of the higher alcohols derived from tallow or coconut oil and synthetic alcohols derived from petroleum; sodium coconut oil fatty monoglyceride sulphates and sulphonates; sodium and potassium salts of sulphuric acid esters of higher (C<sub>8</sub>-C<sub>18</sub>) fatty alcohol-alkylene oxide, particularly ethylene oxide, reaction products; the reaction products of fatty acids such as coconut fatty acids esterified with isethionic acid and neutralised with sodium hydroxide; sodium and potassium salts of fatty acid amides of methyl taurine; alkane monosulphonates such as those derived by reacting alpha-olefins (C<sub>8</sub>-C<sub>20</sub>) with sodium bisulphite and those derived from reacting paraffins with SO<sub>2</sub> and Cl<sub>2</sub> and then hydrolysing with a base to produce a random sulphonate; water-soluble salts of dialkyl esters of sulphosuccinic acid; and olefin sulphonate, which term is used to describe the material made by reacting olefins, particularly C<sub>10</sub>-C<sub>20</sub> alpha-olefins, with SO<sub>3</sub> and then neutralising and hydrolysing the reaction product. The preferred anionic detergent compounds are sodium (C<sub>11</sub>-C<sub>15</sub>) alkyl benzene sulphonates and sodium (C<sub>16</sub>-C<sub>18</sub>) alkyl sulphates.

Mixtures of anionic compounds may also be used in the detergent compositions.

Examples of suitable nonionic surfactants include:

1. The polyethylene oxide condensates of alkyl phenol, e.g. the condensation products of alkyl phenols having an alkyl group containing from 6 to 12 carbon atoms in either a straight chain or branched chain configuration, with ethylene oxide, the said ethylene oxide being present in amounts equal to 3 to 30, preferably 5 to 14 moles of ethylene oxide per mole of alkyl phenol. The alkyl substituent in such compounds may be derived, for example, from polymerised propylene, di-isobutylene, octene and nonene. Other examples include dodecylphenol condensed with 9 moles of ethylene oxide per mole of phenol; dinonylphenol condensed with 11 moles of ethylene oxide per mole of phenol; nonylphenol and disooctylphenol condensed with 13 moles of ethylene oxide.
2. The condensation product of primary or secondary aliphatic alcohols having 8 to 24 carbon atoms, in

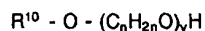
either straight chain or branched chain configuration, with from 2 to 40 moles, preferably 2 to about 9 moles of ethylene oxide per mole of alcohol. Preferably, the aliphatic alcohol comprises between 9 and 18 carbon atoms and is ethoxylated with between 2 and 9, desirably between 3 and 8 moles of ethylene oxide per mole of aliphatic alcohol. The preferred surfactants are prepared from primary alcohols which are either linear (such as those derived from natural fats or prepared by the Ziegler process from ethylene, e.g. such as the Lutensols, Dobanols and Neodols which have about 25% 2-methyl branching (Lutensol being a Trade Name of BASF, Dobanol and Neodol being Trade Names of Shell), or Synperonics, which are understood to have about 50% 2-methyl branching (Synperonic is a Trade Name of I.C.I.) or the primary alcohols having more than 50% branched chain structure sold under the Trade Name Lial by Liquichimica. Specific examples of nonionic surfactants falling within the scope of the invention include Dobanol 45-4, Dobanol 45-7, Dobanol 45-9, Dobanol 91-2.5, Dobanol 91-3, Dobanol 91-4, Dobanol 91-6, Dobanol 91-8, Dobanol 23-6.5, Synperonic 6, Synperonic 14, the condensation products of coconut alcohol with an average of between 5 and 12 moles of ethylene oxide per mole of alcohol, the coconut alkyl portion having from 10 to 14 carbon atoms, and the condensation products of tallow alcohol with an average of between 7 and 12 moles of ethylene oxide per mole of alcohol, the tallow portion comprising essentially between 16 and 22 carbon atoms. Secondary linear alkyl ethoxylates are also suitable in the present compositions, especially those ethoxylates of the Tergitol series having from 9 to 15 carbon atoms in the alkyl group and up to 11, especially from about 3 to 9, ethoxy residues per molecule.

The compound formed by condensing ethylene oxide with a hydrophobic base formed by the condensation of propylene oxide with propylene glycol. The molecular weight of the hydrophobic portion generally falls in the range of about 1500 to 1800. Such synthetic nonionic detergents are available on the market under the Trade Name of "Pluronic", supplied by Wyandotte Chemicals Corporation.

When the detergent-active material comprises a mixture of anionic and nonionic materials, the preferred nonionic material or mixtures thereof for use in this invention will have an HLB (hydrophilic-lipophilic balance) of not more than 10.5, preferably in the range of from 6 to 10, most preferably in the range of 8 to 9.5. As explained, the composition can contain one or a mixture of more than one nonionic detergent-active materials. The mixture can contain one or more nonionic materials having an HLB of more than 10.5, providing the average HLB of the mixture of nonionic materials is not more than 10.5. The HLB scale is a known measure of hydrophilic-lipophilic balance in any compound. It is fully defined in the literature, for example in "Nonionic Surfactants", Volume I, edited by M.J. Schick. A method of determining the HLB of a mixture of nonionic materials is also defined in this reference.

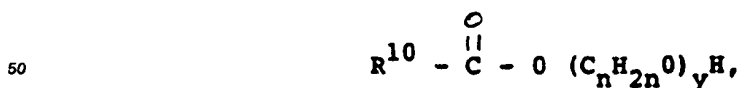
Preferred nonionic materials are the alkoxylate adducts of fatty compounds selected from fatty alcohols, fatty acids, fatty esters, fatty amides and fatty amines. The fatty compound contains at least 10 carbon atoms and the nonionic material contains an average of less than 8 alkylene oxide groups per molecule.

Alkylene oxide adducts of fatty alcohols useful in the present invention, preferably have the general formula:



wherein  $R^{10}$  is an alkyl or alkenyl group having at least 10 carbon atoms, most preferably from 10 to 22 carbon atoms,  $y$  is preferably not more than 10, such as from 0.5 to 3.5, and  $n$  is 2 or 3. Examples of such materials include Synperonic A3 (ex I.C.I.), which is a  $C_{13}$ - $C_{15}$  alcohol with about three ethylene oxide groups per molecule, and Empilan KB3 (ex Marchon) which is lauric alcohol 3EO.

Alkylene oxide adducts of fatty acids useful in the present invention, preferably have the general formula:

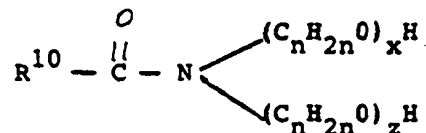


wherein  $R^{10}$ ,  $n$  and  $y$  are as given above. Suitable examples include ESONAL 0334 (ex Diamond Shamrock), which is a tallow fatty acid with about 2.4 ethylene oxide groups per molecule.

Alkylene oxide adducts of fatty esters useful in the present invention include adducts of mono-, di- or triesters of polyhydric alcohols containing 1 to 4 carbon atoms; such as coconut or tallow oil (triglyceride) 3EO (ex Stearine Dubois).

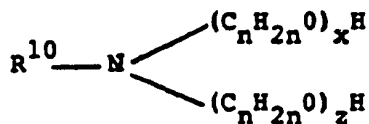
Alkylene oxide adducts of fatty amides useful in the present invention preferably have the general

formula:



wherein  $\text{R}^{10}$  is an alkyl or alkenyl group having at least 10 carbon atoms, most preferably from 10 to 22 carbon atoms,  $n$  is 2 or 3 and  $x$  and  $z$  in total are not more than 4.0, preferably from 0.5 to 3.5, while one of  $x$  and  $z$  can be zero. Examples of such materials include tallow monoethanolamide and diethanolamide, and the corresponding coconut and soya compounds.

Alkylene oxide adducts of fatty amines useful in the present invention preferably have the general formula:



wherein  $\text{R}^{10}$  and  $n$  are as given above, and  $x$  and  $z$  in total are preferably not more than 4.0, most preferably from 0.5 to 3.5. Examples of such materials include Ethomeen T12 (tallow amine 2EO, available from AKZO), Optameet PC5 (coconut alkyl amine 5EO) and Crodamet 1.02 (oleylamine 2EO, available from Croda Chemicals).

Cationic detergent-active materials suitable for use herein include quaternary ammonium surfactants and surfactants of a semi-polar nature, for example amine oxides.

Amounts of amphoteric or zwitterionic detergent compounds can also be used in the composition of the invention, but this is not normally desired owing to their relatively high cost. If any amphoteric or zwitterionic detergent compounds are used, it is generally in small quantities relative to the much more commonly used anionic and/or nonionic detergent-active compounds.

The effective amount of the detergent-active compound or compounds used in the composition of the invention will generally be in the range of from 5 to 50% by weight, preferably from 6 to 30% by weight based on the total composition.

The mixing ratio of anionic to nonionic materials is not very critical and can be varied as desired by the skilled artisan. However, preference here is given to ratios within the range of 4:1 to 1:4, preferably from 2:1 to 1:2.

#### THE DETERGENCY BUILDER

The detergent composition according to the invention also contains a detergency builder, which can be an inorganic builder or an organic builder, in an amount generally within the range of from 5% to 80%, preferably from 10% to 60% by weight.

Examples of phosphorus-containing inorganic detergency builders, when present, include the water-soluble salts, especially alkali metal pyrophosphates, orthophosphates and polyphosphates. Specific examples of inorganic phosphate builders include sodium and potassium tripolyphosphates, phosphates and hexametaphosphates.

Examples of non-phosphorus-containing inorganic detergency builders, when present, include water-soluble alkali metal carbonates, bicarbonates, silicates and crystalline and amorphous aluminosilicates. Specific examples include sodium carbonate (with or without calcite seeds), potassium carbonates, sodium and potassium bicarbonates and silicates.

Examples of organic detergency builders, when present, include the alkali metal, ammonium and substituted ammonium polyacetates, carboxylates, polycarboxylates, polyacetal carboxylates and polyhydroxysulphonates. Specific examples include sodium, potassium, lithium, ammonium and substituted

ammonium salts of ethylenediaminetetraacetic acid, nitrilotriacetic acid, oxydisuccinic acid, melitic acid, benzene polycarboxylic acids and citric acid.

#### THE POLYMER MIXTURE

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The alkalimetal carboxymethyl cellulose is preferably the sodium or the potassium salt. All known types can be used, with different degrees of substitution and viscosities. The degree of substitution generally lies between 0.5 and 0.9 and is mostly 0.7. The term "cellulose" as used above is intended to include starch; thus the corresponding alkyl starch ethers and carboxy methyl starches are also suitable. The cellulose-based compounds are however preferred.

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Polymer (b) is a vinyl pyrrolidone polymer. As is disclosed in the art, polyvinyl pyrrolidone is not a single individual compound but may be obtained in almost any degree of polymerisation. The degree of polymerisation, which is most easily expressed in terms of average molecular weight, is not critical provided the material has the designed water-solubility and soil-suspending power. In general, suitable soil-suspending vinyl pyrrolidone polymers are linear in structure, and have an average molecular weight within the range of 5,000 to 350,000, and preferably from 15,000 to 50,000. Suitable polymers will also, generally, have water solubility of greater than 0.3% at normal wash temperatures.

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The polycarboxylate polymers (c) are disclosed and further characterised in EP-A-0137669 (Procter & Gamble), the most important members of which are:

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(i) those belonging to the class of copolymeric polycarboxylates which, formally at least, are formed from maleic acid as first monomer, and an unsaturated monocarboxylic acid such as acrylic acid or an alpha-C<sub>1</sub>-C<sub>4</sub>-alkyl acrylic acid as second monomer. Preferred copolymers of this class are copolymers of maleic acid (anhydride) and (meth)acrylic acid, as disclosed in EP-B-25551 and GB Patent 1 596 756.

(ii) those belonging to the class of poly (alpha-hydroxyacrylates);

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(iii) those belonging to the class of homopolymeric polyacrylates.

Any polymer of these classes can be chosen as polymer (c) in the polymer additive system, either alone or as mixture, though preference is given to polymers of the classes (i) and (iii).

#### OTHER INGREDIENTS

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The compositions of the invention may also contain a peroxyacid compound bleach system which includes the organic peroxyacids per se, organic and inorganic peroxyacid salts and bleach systems or compounds which form organic peroxyacids in aqueous media by perhydrolysis or hydrolysis.

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Examples of organic peroxyacids per se usable in the present invention are monoperoxyazelaic acid, diperoxyazelaic acid, diperoxyadipic acid, diperoxydodecanedionic acid, decylbutanediperoxoic acid, monoperoxy phthalic acid, peroxybenzoic acid, m-chloroperbenzoic acid and diperoxyisophthalic acid.

Examples of peroxyacid salts usable here include magnesium monoperoxyphthalate, potassium monoperoxysulphate and peroxy-monophosphate.

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Examples of compounds which form organic peroxyacids in situ by hydrolysis are benzoyl peroxide, which generates peroxybenzoic acid, and dipthaloyl peroxide which generates monoperoxyphthalic acid.

These compounds can be used in the composition in amounts from 1 to 25% by weight, preferably from 2 to 10% by weight.

The invention, however, prefers the use of peroxyacid compound bleach systems comprising a mixture of an inorganic or organic peroxide compound and a peroxyacid bleach precursor. These systems generate peroxyacids in situ from the perhydrolysis reaction between the peroxide compound and the peroxyacid bleach precursor.

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The inorganic or organic peroxide compounds as meant here are the so-called peroxyhydrates and include alkali metal perborates, percarbonates, persulfates and perphosphates and also urea peroxide, which liberate hydrogen peroxide in aqueous solution. Preferred peroxide compounds are sodium perborate, which can be in the mono- or tetrahydrate form.

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Any organic peroxyacid bleach precursors generating peroxyacid on perhydrolysis known in the art, as described in, for example, British Patents 836 988, 970 950, 907 356, 855 735 and 1, 246 339; US Patents 4 128 494 and 3 332 882; Canadian Patent 844 481; and European Patent Applications EP-A- 0098021 and EP-A- 0185522, can in principle be used.

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As used such can be named glycerol triacetate, glucose pentaacetate, tetraacetyl xylose, N,N,N',N'-tetraacetyl ethylene diamine (TAED), tetraacetyl glycoluril, N,N'-diacetyl acetoxy methyl malonamide, triacetyl cyanurate, sodium acetoxy benzene sulphonate, sodium nonanoyloxy benzene sulphonate and sodium 3,5,5-trimethyl hexanoyloxy benzene sulphonate.

A particularly preferred peroxyacid compound bleach system for use in the present invention is a mixture of sodium perborate and tetraacetyl ethylene diamine (TAED).

The peroxide compound and the peroxyacid bleach precursor in the compositions of the invention can be used at the usual levels of from 2 to 30% by weight and from 0.5 to 20% by weight, respectively, at any ratio by weight of peroxide compound to peroxyacid precursor ranging from 60:1 to 1:10.

Preferred ranges in the composition of the invention are 2-15% by weight of peroxide compound, e.g. sodium perborate, and from 0.5-10% by weight of peroxyacid precursor, e.g. TAED, in a weight ratio of from 5:1 to 1:5, preferably from 3:1 to 1:2.

Bleach system and the polymer mixture of the invention are important parameters for achieving good colour-care properties. Beneficial effects can be seen already at a polymer mixture level as low as 0.3% which can be increased to about 15% by weight. Generally, however, a polymer mixture level of not more than 10% by weight will be sufficient, with an optimum range of from about 0.6% to 6% by weight.

As explained, detergent compositions formulated according to the invention have the advantage over the compositions of the art in that they show efficient cleaning combined with improved colour-care characteristics.

It should, however, be appreciated that the detergent composition according to the invention may further contain any of the conventional additives in amounts in which such materials are normally employed in fabric-washing detergent compositions and which serve to further improve the laundering characteristics and/or add aesthetic appeal to the composition. Examples of these additives include lather boosters, anti-foaming agents, alkaline materials such as sodium silicates, fabric-softening agents, enzymes such as proteolytic, lipolytic and amylolytic enzymes, corrosion inhibitors, inorganic salts, sequestering agents, colouring agents and perfumes, so long as these additives do not adversely influence the basic objective of the invention.

In a preferred embodiment of the invention, the composition is free from copper ions or other heavy metal ions of the transition series, e.g. cobalt, iron, manganese, chromium and zinc, which can form coloured reaction products and thereby may negate the benefit of colour-care.

In a further preferred embodiment, the invention omits the use of fluorescent agents or optical bleaching agents, as these additives could change the hue of the original fabric colours.

The detergent composition of the invention can be manufactured and presented in the form of a powder, including granules, flakes, etc.; liquid; paste; or bar.

Detergent powder compositions according to the invention can be prepared using any of the conventional manufacturing techniques commonly used or proposed for the preparation of fabric-washing detergent powder compositions. These include slurry-making of the basic ingredients followed by spray-drying or spray-cooling and subsequent dry-dosing of sensitive ingredients not suitable for incorporation prior to the drying or heating step. Other conventional techniques, such as noodling, granulation, dry-mixing, and mixing by fluidisation in a fluidised bed, may be utilised as and when necessary and desired. Such techniques are familiar to those skilled in the art of detergent powder composition manufacture.

In use, the detergent compositions according to the invention are particularly suitable for washing, at lower to medium temperatures, of both cotton and synthetic or mixed cotton/synthetic fabrics.

#### Examples

The invention will now be illustrated in the following examples.

#### Example 1

Detergent compositions were prepared having the formulations set out below:

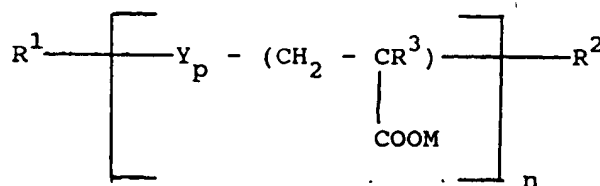
	% by weight	
C <sub>12</sub> -linear alkyl benzene sulphonate	6.0	8.0
C <sub>13</sub> -C <sub>15</sub> alcohol/7 ethylene oxides	4.0	4.0
C <sub>13</sub> -C <sub>15</sub> alcohol/3 ethylene oxides	3.0	4.0
Sodium tripolyphosphate	26.0	26.5
Alkaline sodium silicate (1:2)	6.0	6.0
Sodium sulphate	30.0	30.0
Ethylenediamine tetraacetate (Na-salt)	0.1	0.1
Sodium carboxymethylcellulose	0.5	0.6
Polyvinylpyrrolidone (40,000)	0.5	0.6
Polyacrylate	1.0	-
Maleic acid/acrylic acid copolymer	-	1.0
Sodium perborate tetrahydrate	10.0	8.0
Tetraacetyl ethylene diamine (TAED)	4.0	3.0
Proteolytic enzyme (Savinase 6CM)	0.3	-
Proteolytic enzyme (Alcalase)	-	0.3
Perfume	0.2	0.2
Water	balance	balance

The above compositions were very good at displaying excellent cleaning and detergency performance across the range of wash temperatures with outstanding colour-care performance on coloured fabrics and mixed loads of coloured and white fabrics. No substantial bleeding of colours was observed and, after several washes, the coloured fabrics remained remarkably bright with no substantial dulling or fading being observed. Comparisons between these compositions and similar compositions in which one or more components of the polymer mixture were absent showed a preference for the compositions of the invention, particularly in terms of soil redeposition.

### Claims

1. A detergent composition comprising a detergent-active material and a detergency builder characterised in that it further includes from 0.3 to 15% by weight of a polymer mixture comprising the following polymeric materials (a), (b) and (c):

- (a) an alkalimetal carboxymethylcellulose;
- (b) a vinylpyrrolidone polymer having an average molecular weight within the range of 5,000 to 350,000;
- (c) a polycarboxylate polymer selected from compounds having the empirical formula:



wherein Y is a maleic acid (anhydride) unit; R<sup>1</sup> and R<sup>2</sup> are bleach- and alkali-stable polymer-end groups; R<sup>3</sup> is H, OH or C<sub>1</sub>-C<sub>4</sub> alkyl; M is H, alkali metal, alkaline earth metal, ammonium or other water-soluble cation; p is from 0 to 2; and n is at least 10; and mixtures thereof at a mixing ratio of polymer (a):polymer (b) within the range of 1:2 to 2:1 and of polymer (b):polymer (c) within the range of 1:1 to 1:4.

2. A detergent composition according to claim 1, characterised in that it comprises from 0.6% to 6% by weight of said polymeric mixture.
3. A detergent composition according to claim 1, characterised in that said copolymeric polycarboxylate is



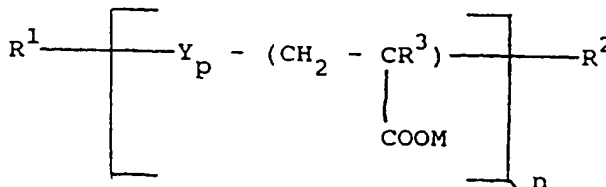
a copolymer of maleic acid (anhydride) and (meth)acrylic acid.

4. A detergent composition according to claim 1, characterised in that said polymer (c) is a homopolymeric polyacrylate.
5. A detergent composition according to any one of the above claims, characterised in that the detergent-active material contains a nonionic material or mixture thereof having an HLB of not more than 10.5.
6. A detergent composition according to claim 1, characterised by further comprising a peroxyacid compound bleach system.

#### Revendications

1. Une composition détergente comprenant un matériau détergent actif et un édificateur de détergence caractérisée en ce qu'elle contient de plus de 0,3% à 15% en poids d'un mélange polymère comprenant les matériaux polymères (a), (b) et (c) suivants :

- (a) une carboxyméthylcellulose de métal alcalin;
- (b) un polymère vinylpyrrolidone ayant une masse moléculaire moyenne comprise dans la gamme allant de 5.000 à 350.000;
- (c) un polymère polycarboxylate sélectionné à partir des composés ayant la formule empirique suivante :



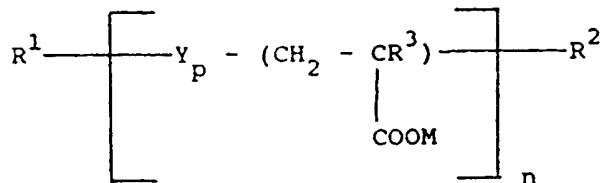
dans laquelle Y est une unité d'acide maléique (anhydride) ; R<sup>1</sup> et R<sup>2</sup> sont des groupes à extrémité polymère stable au niveau alcalin et blanchissant ; R<sub>3</sub> est H, OH ou un alkyl en C<sub>1</sub>-C<sub>4</sub> ; M est H, du métal alcalin, du métal alcalino-terreux, de l'ammonium ou un autre cation soluble dans l'eau ; p va de 0 à 2 ; n est au moins égal à 10 ; et des mélanges de ceux-ci ; dans un rapport de mélange de polymère (a) sur polymère (b) compris dans la gamme allant de 1/2 à 2/1 et dans un rapport de mélange de polymère (b) sur polymère (c) compris dans la gamme allant de 1/1 à 1/4.

2. Une composition détergente selon la revendication 1, caractérisée en ce qu'elle comprend de 0,6 à 6% en poids dudit mélange polymère.
3. Une composition détergente selon la revendication 1, caractérisée en ce que ledit polycarboxylate copolymère est un copolymère d'acide maléique et d'acide (méth)acrylique.
4. Une composition détergente selon la revendication 1, caractérisée en ce que ledit polymère (c) est un polyacrylate homopolymère.
5. Une composition détergente selon l'une des revendications précédentes, caractérisée en ce que le matériau détergent actif contient un matériau non ionique ou un mélange de ceux-ci, ayant un HLB qui n'est pas supérieur à 10,5.
6. Une composition détergente selon la revendication 1, caractérisée en ce qu'elle comprend de plus un système de blanchiment de composé peroxyacide.

#### Patentansprüche

1. Detergens-Zusammensetzung, die ein Detergens-aktives Material und einen Detergens-Builder umfaßt, dadurch gekennzeichnet, daß sie weiter 0,3 bis 15 Gew.-% einer Polymermischung einschließt, die die folgenden polymeren Materialien (a), (b) und (c) umfaßt:

- (a) eine Alkalimetall-Carboxymethylzellulose;  
 (b) ein Vinylpyrrolidonpolymer mit einem durchschnittlichen Molekulargewicht im Bereich von 5000 bis 350000;  
 (c) ein Polycarboxylatpolymer ausgewählt aus Verbindungen der empirischen Formel:



worin Y eine Maleinsäureanhydrid-Einheit ist; R<sup>1</sup> und R<sup>2</sup> bleich- und alkalistabile Polymerendgruppen sind; R<sup>3</sup> H, OH oder C<sub>1</sub>-C<sub>4</sub> Alkyl; M H, Alkalimetall, Erdalkalimetall, Ammonium oder anderes wasserlösliches Kation ist; p 0 bis 2 ist; n wenigstens 10 ist; und Mischungen davon bei einem Mischverhältnis von Polymer (a) : Polymer (b) im Bereich von 1:2 bis 2:1 und von Polymer (b) : Polymer (c) im Bereich von 1:1 bis 1:4.

2. Detergens-Zusammensetzung nach Anspruch 1, dadurch gekennzeichnet, daß sie 0,6 bis 6 Gew.-% der polymeren Mischung umfaßt.
3. Detergens-Zusammensetzung nach Anspruch 1, dadurch gekennzeichnet, daß das copolymere Polycarboxylat ein Copolymer von Maleinsäureanhydrid und (Meth)acrylsäure ist.
4. Detergens-Zusammensetzung nach Anspruch 1, dadurch gekennzeichnet, daß das Polymer (c) ein homopolymeres Polyacrylat ist.
5. Detergens-Zusammensetzung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Detergensaktive Material ein nicht-ionisches Material oder Mischung davon mit einem HLB von nicht mehr als 10,5 enthält.
6. Detergens-Zusammensetzung nach Anspruch 1, dadurch gekennzeichnet, daß sie weiter ein Peroxysäureverbindung-Bleichsystem umfaßt.

⑫

**EUROPEAN PATENT APPLICATION**

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⑤④ **Detergent composition.**

- ⑤⑦ A detergent composition especially suitable for washing coloured fabrics includes a polymer mixture comprising
- a) an alkalimetal carboxymethyl cellulose;
  - b) a vinylpyrrolidone polymer such as PVP with a molecular weight of 40,000; and
  - c) a carboxylate polymer such as polyacrylate or maleic acid/acrylic acid copolymer.

The compositions optionally contain a peroxyacid bleach system. Improved colour care of fabrics is obtained compared with any one or two of these polymers.

**EP 0 265 257 A2**

## Description

DETERGENT COMPOSITIONTECHNICAL FIELD OF INVENTION

5 This invention relates to a detergent composition; particularly it relates to a fabric-washing detergent composition having improved colour-care properties.

When washing coloured fabrics, various factors can contribute to a loss of colour brightness. Thus, the redeposition of soil from the wash liquor may result in colour dulling.

10 Also, when washing mixed coloured fabrics and mixed loads of coloured and white fabrics, there is the risk of dye-transfer through the wash liquor from one fabric to another, which will result in bleeding of colours, discolouration and/or staining of the fabrics. With the fashion of moving towards more coloured clothing and textile materials, especially multi-coloureds, the problem of dye-transfer in the wash has become more acute.

BACKGROUND AND PRIOR ART

15 Various proposals have been made in the art to resolve this problem, but so far without much success. For example, in GB-A- 1 368 400 (Procter & Gamble), dye-transfer-inhibiting compositions were proposed which comprise a peroxygen bleach compound, e.g. an organic peroxyacid, combined with rather complex aldehyde or ketone compounds as bleach activators. These compositions have several drawbacks in that not only do they use rather expensive and complex chemical compounds, but also in that they are not very effective.

20 Other compositions having dry-transfer-inhibiting action are also disclosed in EP-A- 0024367 (Unilever) and EP-A-0024368 (Unilever) based on the activation of organic peracids or organic peracid precursors with bromide ions. Still, the main drawback of these compositions is that they too exert a rather strong direct fabric dye bleaching, tending to cause fading of the coloured fabrics.

25 EP-A- 0058444 (Unilever) describes washing compositions comprising a bleach system consisting essentially of an organic peracid or an organic peracid precursor in conjunction with a water-soluble iodide salt. There are some snags in the use of iodide catalyst, namely 1) the risk of staining due to iodine formation and 2) the effect of direct fabric dye bleaching.

30 EP-A- 0143491 (Unilever) proposes the use of a copper catalyst together with a peracid compound as the bleach system for reducing dye-transfer, and in GB Patent 1 450 234 (Kao Soap) there is disclosed a bleaching detergent composition comprising sodium percarbonate together with polyethyleneglycol or polyvinylpyrrolidone.

Apart from the above-mentioned drawbacks, the proposed compositions of the art are deficient in one way or another and are thus far from ideal for being satisfactory as having real colour-care properties.

35 Efficient washing of coloured and mixed coloured/white fabrics requires more than cleaning alone; it should also take good care of the colours in a way that colour-bleeding due to dye-transfer, greying, dulling and/or fading, as well as changes in hue, are minimised such that the original colours and brightness of the fabrics are preserved as much as possible.

40 It is therefore an object of the present invention to provide an efficient detergent composition which can be used for washing of mixed coloured and mixed loads of coloured and white fabrics, having improved colour-care properties with only minimal to substantially nil dye-transfer, wherein the drawbacks of the art are mitigated to a substantial degree.

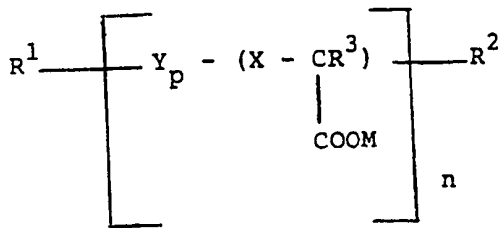
DEFINITION OF THE INVENTION

45 According to this invention, a detergent composition adapted for washing fabrics and having improved colour-care properties is provided, comprising a detergent-active material and a detergency builder characterised in that it further includes from 0.3% to 15% by weight of a polymer mixture comprising the following polymeric materials (a), (b) and (c):

- (a) an alkali metal carboxymethylcellulose;
- (b) a vinylpyrrolidone polymer having an average molecular weight within the range of about 5000 to 50 about 350,000;
- (c) a polycarboxylate polymer selected from compounds having the empirical formula:

55

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wherein X is 0 or CH<sub>2</sub>; Y is a co-monomer or mixture of co-monomers; R<sup>1</sup> and R<sup>2</sup> are bleach-and-alkali-stable polymer-end groups; R<sup>3</sup> is H, OH or C<sub>1</sub>-C<sub>4</sub> alkyl; M is H, alkali metal, alkaline earth metal, ammonium or other water-soluble cation; p is from 0 to 2; and n is at least 10; and mixtures therefore; at a mixing ration of a) to b) within the range 1:2 to 2:1 and of b) to c) within the range of 1:1 to 1:4.

## DESCRIPTION OF THE INVENTION

**DESCRIPTION OF THE INVENTION**

The individual components of the polymer additive system are well known in detergent technology and may have found commercial exploitation. However, the specific combination is especially beneficial in fabric-washing detergent compositions having improved colour-care properties.

## THE DETERGENT ACTIVE MATERIAL

THE DETERGENT ACTIVE MATERIAL  
The detergent composition of the invention contains at least one detergent-active material which may be anionic, nonionic or cationic in nature, but mixtures of anionic and nonionic materials are preferred.

The anionic detergent-active material can be a soap or a non-soap (synthetic) anionic material. Anionic detergent-active materials are commercially available and are fully described in the literature, for example in "Surface Active Agents and Detergents", Volumes I and II, by Schwartz Perry and Berch.

Synthetic anionic detergent-active materials useful in the present invention are water-soluble alkali metal salts of organic sulphates and sulphonates having alkyl radicals containing from about 8 to about 22 carbon atoms, the term alkyl being used to include the alkyl portion of higher acyl radicals. Examples of suitable synthetic anionic detergent compounds are sodium and potassium alkyl sulphates, especially those obtained by sulphating higher (C<sub>8</sub>-C<sub>18</sub>) alcohols produced for example from tallow or coconut oil, sodium and potassium alkyl (C<sub>8</sub>-C<sub>20</sub>) benzene sulphonates, particularly sodium linear secondary alkyl (C<sub>10</sub>-C<sub>15</sub>) benzene sulphonates; especially those ethers of the higher alcohols derived from tallow or coconut oil and synthetic alcohols derived from petroleum; sodium coconut oil fatty monoglyceride sulphates and sulphonates; sodium and potassium salts of sulphuric acid esters of higher (C<sub>8</sub>-C<sub>18</sub>) fatty alcohol-alkylene oxide, particularly ethylene oxide, reaction products; the reaction products of fatty acids such as coconut fatty acids esterified with isethionic acid and neutralised with sodium hydroxide; sodium and potassium salts of fatty acid amides of methyl taurine; alkane monosulphonates such as those derived by reacting alpha-olefins (C<sub>8</sub>-C<sub>20</sub>) with sodium bisulphite and those derived from reacting paraffins with SO<sub>2</sub> and C<sub>2</sub> and then hydrolysing with a base to produce a random sulphonate; water-soluble salts of dialkyl esters of sulphosuccinic acid; and olefin sulphonates, which term is used to describe the material made by reacting olefins, particularly C<sub>10</sub>-C<sub>20</sub> alpha-olefins, with SO<sub>3</sub> and then neutralising and hydrolysing the reaction product. The preferred anionic detergent compounds are sodium (C<sub>11</sub>-C<sub>15</sub>) alkyl benzene sulphonates and sodium (C<sub>18</sub>-C<sub>18</sub>) alkyl sulphates.

Mixtures of anionic compounds may also be used in the detergent compositions.

Examples of suitable nonionic surfactants include:

1. The polyethylene oxide condensates of alkyl phenol, e.g. the condensation products of alkyl phenols having an alkyl group containing from 6 to 12 carbon atoms in either a straight chain or branched chain configuration, with ethylene oxide, the said ethylene oxide being present in amounts equal to 3 to 30, preferably 5 to 14 moles of ethylene oxide per mole of alkyl phenol. The alkyl substituent in such compounds may be derived, for example, from polymerised propylene, di-isobutylene, octene and nonene. Other examples include dodecylphenol condensed with 9 moles of ethylene oxide per mole of phenol; dinonylphenol condensed with 11 moles of ethylene oxide per mole of phenol; nonylphenol and dioctylphenol condensed with 13 moles of ethylene oxide.

2. The condensation product of primary or secondary aliphatic alcohols having 8 to 24 carbon atoms, in either straight chain or branched chain configuration, with from 2 to about 40 moles, preferably 2 to about 9 moles of ethylene oxide per mole of alcohol. Preferably, the aliphatic alcohol comprises between 9 and 18 carbon atoms and is ethoxylated with between 2 and 9, desirably between 3 and 8 moles of ethylene oxide per mole of aliphatic alcohol. The preferred surfactants are prepared from primary alcohols which are either linear (such as those derived from natural fats or prepared by the Ziegler process from ethylene, e.g. such as the Lutensols, Dobanols and Neodols which have about 25% 2-methyl branching (Lutensol being a Trade Name of BASF, Dobanol and Neodol being Trade Names of Shell), or Synerponics, which are understood to have about 50% 2-methyl branching (Synerponic is a Trade Name of I.C.I.) or the primary alcohols having more than 50% branched chain structure sold under

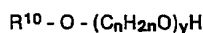
the Trade Name Lial by Liquichimica. Specific examples of nonionic surfactants falling within the scope of the invention include Dobanol 45-4, Dobanol 45-7, Dobanol 45-9, Dobanol 91-2.5, Dobanol 91-3, Dobanol 91-4, Dobanol 91-6, Dobanol 91-8, Dobanol 23-6.5, Synperonic 6, Synperonic 14, the condensation products of coconut alcohol with an average of between 5 and 12 moles of ethylene oxide per mole of alcohol, the coconut alkyl portion having from 10 to 14 carbon atoms, and the condensation products of tallow alcohol with an average of between 7 and 12 moles of ethylene oxide per mole of alcohol, the tallow portion comprising essentially between 16 and 22 carbon atoms. Secondary linear alkyl ethoxylates are also suitable in the present compositions, especially those ethoxylates of the Tergitol series having from about 9 to 15 carbon atoms in the alkyl group and up to about 11, especially from about 3 to 9, ethoxy residues per molecule.

The compound formed by condensing ethylene oxide with a hydrophobic base formed by the condensation of propylene oxide with propylene glycol. The molecular weight of the hydrophobic portion generally falls in the range of about 1500 to 1800. Such synthetic nonionic detergents are available on the market under the Trade Name of "Pluronic", supplied by Wyandotte Chemicals Corporation.

When the detergent-active material comprises a mixture of anionic and nonionic materials, the preferred nonionic material or mixtures thereof for use in this invention will have an HLB (hydrophilic-lipophilic balance) of not more than 10.5, preferably in the range of from 6 to 10, most preferably in the range of 8 to 9.5. As explained, the composition can contain one or a mixture of more than one nonionic detergent-active materials. The mixture can contain one or more nonionic materials having an HLB of more than 10.5, providing the average HLB of the mixture of nonionic materials is not more than 10.5. The HLB scale is a known measure of hydrophilic-lipophilic balance in any compound. It is fully defined in the literature, for example in "Nonionic Surfactants", Volume I, edited by M.J. Schick. A method of determining the HLB of a mixture of nonionic materials is also defined in this reference.

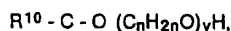
Preferred nonionic materials are the alkoxylate adducts of fatty compounds selected from fatty alcohols, fatty acids, fatty esters, fatty amides and fatty amines. The fatty compound contains at least 10 carbon atoms and the nonionic material contains an average of less than 8 alkylene oxide groups per molecule.

Alkylene oxide adducts of fatty alcohols useful in the present invention, preferably have the general formula:



wherein  $R^{10}$  is an alkyl or alkenyl group having at least 10 carbon atoms, most preferably from 10 to 22 carbon atoms,  $y$  is preferably not more than 10, such as from 0.5 to about 3.5, and  $n$  is 2 or 3. Examples of such materials include Synperonic A3 (ex I.C.I.), which is a  $C_{13}$ - $C_{15}$  alcohol with about three ethylene oxide groups per molecule, and Empilan KB3 (ex Marchon) which is lauric alcohol 3EO.

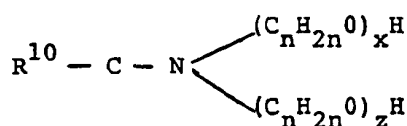
Alkylene oxide adducts of fatty acids useful in the present invention, preferably have the general formula:



wherein  $R^{10}$ ,  $n$  and  $y$  are as given above. Suitable examples include ESONAL 0334 (ex Diamond Shamrock), which is a tallow fatty acid with about 2.4 ethylene oxide groups per molecule.

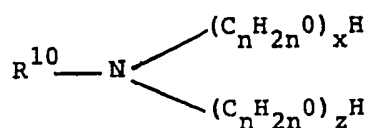
Alkylene oxide adducts of fatty esters useful in the present invention include adducts of mono-, di- or triesters of polyhydric alcohols containing 1 to 4 carbon atoms; such as coconut or tallow oil (triglyceride) 3EO (ex Stearine Dubois).

Alkylene oxide adducts of fatty amides useful in the present invention preferably have the general formula:



wherein  $R^{10}$  is an alkyl or alkenyl group having at least 10 carbon atoms, most preferably from 10 to 22 carbon atoms,  $n$  is 2 or 3 and  $x$  and  $z$  in total are not more than 4.0, preferably from about 0.5 to about 3.5, while one of  $x$  and  $z$  can be zero. Examples of such materials include tallow monoethanolamide and diethanolamide, and the corresponding coconut and soya compounds.

Alkylene oxide adducts of fatty amines useful in the present invention preferably have the general formula:



wherein  $R^{10}$  and  $n$  are as given above, and  $x$  and  $z$  in total are preferably not more than 4.0, most preferably from about 0.5 to about 3.5. Examples of such materials include Ethomeen T12 (tallow amine 2EO, available from AKZO), Optameet PC5 (coconut alkyl amine 5EO) and Crodamet 1.02 (oleylamine 2EO, available from Croda Chemicals).

Cationic detergent-active materials suitable for use herein include quaternary ammonium surfactants and surfactants of a semi-polar nature, for example amine oxides.

Amounts of amphoteric or zwitterionic detergent compounds can also be used in the composition of the invention, but this is not normally desired owing to their relatively high cost. If any amphoteric or zwitterionic detergent compounds are used, it is generally in small quantities relative to the much more commonly used anionic and/or nonionic detergent-active compounds.

The effective amount of the detergent-active compound or compounds used in the composition of the invention will generally be in the range of from 5 to 50% by weight, preferably from 6 to 30% by weight based on the total composition.

The mixing ratio of anionic to nonionic materials is not very critical and can be varied as desired by the skilled artisan. However, preference here is given to ratios within the range of 4:1 to 1:4, preferably from 2:1 to 1:2.

#### THE DETEGENCY BUILDER

The detergent composition according to the invention also contains a detergency builder, which can be an inorganic builder or an organic builder, in an amount generally within the range of from about 5% to about 80%, preferably from 10% to 60% by weight.

Examples of phosphorus-containing inorganic detergency builders, when present, include the water-soluble salts, especially alkali metal pyrophosphates, orthophosphates and polyphosphates. Specific examples of inorganic phosphate builders include sodium and potassium triphosphates, phosphates and hexametaphosphates.

Examples of non-phosphorus-containing inorganic detergency builders, when present, include water-soluble alkali metal carbonates, bicarbonates, silicates and crystalline and amorphous aluminosilicates. Specific examples include sodium carbonate (with or without calcite seeds), potassium carbonates, sodium and potassium bicarbonates and silicates.

Examples of organic detergency builders, when present, include the alkali metal, ammonium and substituted ammonium polyacetates, carboxylates, polycarboxylates, polyacetal carboxylates and polyhydroxysulphonates. Specific examples include sodium, potassium, lithium, ammonium and substituted ammonium salts of ethylenediaminetetraacetic acid, nitrilotriacetic acid, oxydisuccinic acid, melitic acid, benzene polycarboxylic acids and citric acid.

#### THE POLYMER MIXTURE

The alkali metal carboxymethyl cellulose is preferably the sodium or the potassium salt. All known types can be used, with different degrees of substitution and viscosities. The degree of substitution generally lies between 0.5 and 0.9 and is mostly about 0.7. The term "cellulose" as used above is intended to include starch; thus the corresponding alkyl starch ethers and carboxy methyl starches are also suitable. The cellulose-based compounds are however preferred.

Polymer (b) is a vinyl pyrrolidone polymer. As is disclosed in the art, polyvinyl pyrrolidone is not a single individual compound but may be obtained in almost any degree of polymerisation. The degree of polymerisation, which is most easily expressed in terms of average molecular weight, is not critical provided the material has the designed water solubility and soil-suspending power. In general, suitable soil-suspending vinyl pyrrolidone polymers are linear in structure, and have an average molecular weight within the range of about 5,000 to about 350,000, and preferably from about 15,000 to about 50,000. Suitable polymers will also, generally, have a water solubility of greater than 0.3% at normal wash temperatures.

The polycarboxylate polymers (c) are disclosed and further characterised in EP-A-0137669 (Procter & Gamble), the most important members of which are:

(i) those belonging to the class of copolymeric polycarboxylates which, formally at least, are formed from an unsaturated polycarboxylic acid such as maleic acid, citraconic acid, itaconic acid and metaconic acid as first monomer, and an unsaturated monocarboxylic acid such as acrylic acid or an  $\alpha$ -C<sub>1</sub>-C<sub>4</sub>-alkyl acrylic acid as second monomer. Preferred copolymers of this class are copolymers of maleic acid (anhydride) and (meth) acrylic acid, as disclosed in EP-B-25551 and GB Patent 1 596 756.

(ii) those belonging to the class of poly ( $\alpha$ -hydroxyacrylates);

(iii) those belonging to the class of polyacetal carboxylates or acetal polycarboxylates; and

(iv) those belonging to the class of homopolymeric polyacrylates.

Any polymer of these classes can be chosen as polymer (c) in the polymer additive system, either alone or as mixture, though preference is given to polymers of the classes (i) and (iv).

#### OTHER INGREDIENTS

5 The compositions of the invention may also contain a peroxyacid compound bleach system which includes the organic peroxyacids per se, organic and inorganic peroxyacid salts and bleach systems or compounds which form organic peroxyacids in aqueous media by perhydrolysis or hydrolysis.

Examples of organic peroxyacids per se usable in the present invention are monoperoxyazelaic acid, diperoxyazelaic acid, diperoxyadipic acid, diperoxydodecanedionic acid, decylbutanediperoxoic acid, 10 monoperoxy phthalic acid, peroxybenzoic acid, m-chloroperbenzoic acid and diperoxyisophthalic acid.

Examples of peroxyacid salts usable here include magnesium monoperoxyphthalate, potassium monopersulphate and peroxymonophosphate.

Examples of compounds which form organic peroxyacids in situ by hydrolysis are benzoyl peroxide, which generates peroxybenzoic acid, and diphtaloyl peroxide which generates monoperoxyphthalic acid.

15 These compounds can be used in the composition in amounts from 1 to 25% by weight, preferably from 2 to 10% by weight.

The invention, however, prefers the use of peroxyacid compound bleach systems comprising a mixture of an inorganic or organic peroxide compound and a peroxyacid bleach precursor. These systems generate peroxyacids in situ from the perhydrolysis reaction between the peroxide compound and the peroxyacid 20 bleach precursor.

The inorganic or organic peroxide compounds as meant here are the so-called peroxyhydrates and include alkali metal perborates, percarbonates, persilicates and perphosphates and also urea peroxide, which liberate hydrogen peroxide in aqueous solution. Preferred peroxide compounds are sodium perborate, which can be in the mono- or tetrahydrate form.

25 Any organic peroxyacid bleach precursors generating peroxyacid on perhydrolysis known in the art, as described in, for example, British Patents 836 988, 970 950, 907 356, 855 735 and 1, 246 339; US Patents 4 128 494 and 3 332 882; Canadian Patent 844 481; and European Patent Applications EP-A- 0098021 and EP-A- 0185522, can in principle be used.

30 As used such can be named glycerol triacetate, glucose pentaacetate, tetraacetyl xylose, N,N,N',N'-tetraacetyl ethylene diamine (TAED), tetraacetyl glycuril, N,N'-diacetyl acetoxy methyl malonamide, triacetyl cyanurate, sodium acetoxy benzene sulphonate, sodium nonanoyloxy benzene sulphonate and sodium 3,5,5-trimethyl hexanoyloxy benzene sulphonate.

A particularly preferred peroxyacid compound bleach system for use in the present invention is a mixture of sodium perborate and tetraacetyl ethylene diamine (TAED).

35 The peroxide compound and the peroxyacid bleach precursor in the compositions of the invention can be used at the usual levels of from about 2 to 30% by weight and from about 0.5 to 20% by weight, respectively, at any ratio by weight of peroxide compound to peroxyacid precursor ranging from about 60:1 to about 1:10.

Preferred ranges in the composition of the invention are 2-15% by weight of peroxide compound, e.g. sodium perborate, and from 0.5-10% by weight of peroxyacid precursor, e.g. TAED, in a weight ratio of from 40 5:1 to 1:5, preferably from 3:1 to 1:2.

Bleach system and the polymer mixture of the invention are important parameters for achieving good colour-care properties. Beneficial effects can be seen already at a polymer mixture level as low as 0.3% which can be increased to about 15% by weight. Generally, however, a polymer mixture level of not more than 10% by weight will be sufficient, with an optimum range of from about 0.6% to 6% by weight.

45 As explained, detergent compositions formulated according to the invention have the advantage over the compositions of the art in that they show efficient cleaning combined with improved colour-care characteristics.

It should, however, be appreciated that the detergent composition according to the invention may further contain any of the conventional additives in amounts in which such materials are normally employed in fabric-washing detergent compositions and which serve to further improve the laundering characteristics and/or add aesthetic appeal to the composition. Examples of these additives include lather boosters, anti-foaming agents, alkaline materials such as sodium silicates, fabric-softening agents, enzymes such as proteolytic, lipolytic and amylolytic enzymes, corrosion inhibitors, inorganic salts, sequestering agents, colouring agents and perfumes, so long as these additives do not adversely influence the basic objective of 55 the invention.

In a preferred embodiment of the invention, the composition is free from copper ions or other heavy metal ions of the transition series, e.g. cobalt, iron, manganese, chromium and zinc, which can form coloured reaction products and thereby may negate the benefit of colour-care.

60 In a further preferred embodiment, the invention omits the use of fluorescent agents or optical bleaching agents, as these additives could change the hue of the original fabric colours.

The detergent composition of the invention can be manufactured and presented in the form of a powder, including granules, flakes, etc.; liquid; paste; or bar.

65 Detergent powder compositions according to the invention can be prepared using any of the conventional manufacturing techniques commonly used or proposed for the preparation of fabric-washing detergent powder compositions. These include slurry-making of the basic ingredients followed by spray-drying or



spray-cooling and subsequent dry-dosing of sensitive ingredients not suitable for incorporation prior to the drying or heating step. Other conventional techniques, such as noodling, granulation, dry-mixing, and mixing by fluidisation in a fluidised bed, may be utilised as and when necessary and desired. Such techniques are familiar to those skilled in the art of detergent powder composition manufacture.

In use, the detergent compositions according to the invention are particularly suitable for washing, at lower to medium temperatures, of both cotton and synthetic or mixed cotton/synthetic fabrics.

#### Examples

The invention will now be illustrated in the following examples.

#### Example 1

Detergent compositions were prepared having the formulations set out below:

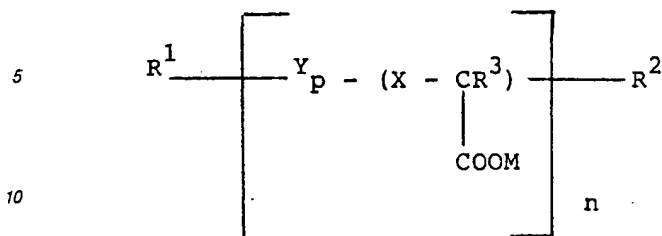
	% by weight	
C <sub>12</sub> -linear alkyl benzene sulphonate	6.0	8.0
C <sub>13</sub> -C <sub>15</sub> alcohol/7 ethylene oxides	4.0	4.0
C <sub>13</sub> -C <sub>15</sub> alcohol/3 ethylene oxides	3.0	4.0
Sodium tripolyphosphate	26.0	26.5
Alkaline sodium silicate (1:2)	6.0	6.0
Sodium sulphate	30.0	30.0
Ethylenediamine tetraacetate (Na-salt)	0.1	0.1
Sodium carboxymethylcellulose	0.5	0.6
Polyvinylpyrrolidone (40,000)	0.5	0.6
Polyacrylate	1.0	-
Maleic acid/acrylic acid copolymer	-	1.0
Sodium perborate tetrahydrate	10.0	8.0
Tetraacetyl ethylene diamine (TAED)	4.0	3.0
Proteolytic enzyme (Savinase 6CM)	0.3	-
Proteolytic enzyme (Alcalase)	-	0.3
Perfume	0.2	0.2
Water	balance	balance

The above compositions were very good at displaying excellent cleaning and detergency performance across the range of wash temperatures with outstanding colour-care performance on coloured fabrics and mixed loads of coloured and white fabrics. No substantial bleeding of colours was observed and, after several washes, the coloured fabrics remained remarkably bright with no substantial dulling or fading being observed. Comparisons between these compositions and similar compositions in which one or more components of the polymer mixture were absent showed a preference for the compositions of the invention, particularly in terms of soil redeposition.

#### Claims

1. A detergent composition comprising a detergent-active material and a detergency builder characterised in that it further includes from 0.3 to 15% by weight of a polymer mixture comprising the following polymeric materials (a), (b) and (c):

- (a) an alkalimetal carboxymethylcellulose;
- (b) a vinylpyrrolidone polymer having an average molecular weight within the range of about 5000 to about 350,000;
- (c) a polycarboxylate polymer selected from compounds having the empirical formula:



15 wherein X is O or CH<sub>2</sub>; Y is a co-monomer or mixture of co-monomers; R<sup>1</sup> and R<sup>2</sup> are bleach-and alkali-stable polymer-end groups; R<sup>3</sup> is H, OH or C<sub>1</sub>-C<sub>4</sub> alkyl; M is H, alkali metal, alkaline earth metal, ammonium or other water-soluble cation; p is from 0 to 2; and n is at least 10; and mixtures thereof at a mixing ratio of polymer (a) : polymer (b) within the range of 1:2 to 2:1 and of polymer (b) : polymer (c) within the range of 1:1 to 1:4.

20 2. A detergent composition according to claim 1, characterised in that it comprises from 0.6% to 6% by weight of said polymer mixture.

3. A detergent composition according to any one of claims 1-3, characterised in that said polymer (c) is a copolymeric polycarboxylate formed from an unsaturated polycarboxylic acid and an unsaturated monocarboxylic acid.

4. A detergent composition according to claim 3, characterised in that said copolymeric polycarboxylate is a copolymer of maleic acid (anhydride) and (meth)acrylic acid.

5. A detergent composition according to claim 1, characterised in that said polymer (c) is a homopolymeric polyacrylate.

6. A detergent composition according to any one of the above claims, characterised in that the detergent-active material contains a nonionic material or mixture thereof having an HLB of not more than 10.5.

7. A detergent composition according to Claim 1, characterised by further comprising a peroxyacid compound bleach system.

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(54) **Detergent composition.**

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 (57) A detergent composition especially suitable for washing coloured fabrics includes a polymer mixture comprising  
 a) an alkalimetal carboxymethyl cellulose;  
 b) a vinylpyrrolidone polymer such as PVP with a molecular weight of 40,000; and  
 c) a carboxylate polymer such as polyacrylate or maleic acid/acrylic acid copolymer.

is obtained compared with any one or two of these polymers.

The compositions optionally contain a perox-yacid bleach system. Improv d colour care of fabrics



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number

EP 87 30 9338

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Y	EP-A-0 102 923 (CIBA-GEIGY) * Example 3; page 9, lines 15-30; claims *	1-7	C 11 D 3/37 C 11 D 3/22
Y	DE-A-2 814 329 (HENKEL) * Pages 13,16; claims 1,8; page 8, lines 28-36 *	1-7	
Y	FR-A-2 144 721 (PROCTER & GAMBLE) * Example 1; page 7, lines 12-13; page 8, lines 11-15; claims 1-3,7,9 *	1-7	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			C 11 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 17-03-1989	Examiner PFANNENSTEIN H.F.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			